TREATMENT OF CONGENITAL DISLOCATION OF THE HIP.[1]

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EVERY year a very considerable number of cases of congenital dislocation of the hip present themselves at the New York Orthopædic Dispensary, and I have also seen some cases in my private practice, so that I have notes on 113 cases, but they are very fragmentary, and most of the cases have been sent away for one reason or another without treatment.

Until recent years, although occasionally a good result was recorded where the surrounding conditions had all been most favorable, the prognosis generally was altogether too poor to make either surgeon or parents undertake a course of treatment without great reluctance. Thus it happened that when these children had pain in the joint they would wear some supporting splint for a time or use axillary crutches until the pain disappeared. If the limp was very much exaggerated, a high sole of the proper height was ordered for the short limb. Increasing in this way the elevation of this foot was theoretically bad practice, since the affected side of the pelvis was thereby raised and the more perpendicular position of the dorsum of the ilium offered less resistance to the slipping upward of the head of the femur. Practically, however, I could not determine from my notes that the cases treated with the high shoe showed any greater subsequent shortening than the other cases.

In none of my cases was there pronounced flexion or adduction. There are so many cases on record, however, which show great disability from these deformities that we must remember that they occur when we make our prognosis.

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[1] Presented to the American Orthopædic Association, May, 1894.

Thirty-one per cent. of these cases suffered from pain at times. The usual story was that after jumping rope, or taking a longer walk than usual, or after carrying some weight, pain was felt in the hip. Sometimes it was severe and lasted several months; generally it disappeared after a few days' rest in bed. These attacks of pain seem to be especially apt to develop during the periods of very rapid growth. They were very common in girls from eleven to fourteen years of age. In those who did complain of pain the attacks were generally recurrent. These cases seemed to show also a considerable amount of shortening, perhaps more than the average. In one case the recurrence of pain was noted soon after childbirth, which seemed to indicate that the ligaments about the hip-joint shared in the relaxation often found in the pelvic ligaments at the end of gestation.

In many of the cases I examined there was a spinal curvature, but they were due to the short limb, and therefore were not permanent, and were easily corrected. I attempted to determine the average shortening in untreated cases at the various ages, but my series of cases was not large enough to make the results more than suggestive. I only cite those years where I have at least five cases from which to take an average. These show that between one and two years the average shortening is $\frac{5}{8}$ inch; two and three years, $\frac{5}{8}$ inch; three and four years, $\frac{6}{8}$ inch; four and five years, $\frac{7}{8}$ inch; five and six years, $\frac{9}{8}$ inch; seven and eight years, $\frac{13}{8}$ inch; eleven and twelve years, $\frac{12}{8}$ inch; thirteen and fourteen years, $\frac{15}{8}$ inch. The shortening, therefore, pretty steadily increases with growth, as we should expect.

The same may be said of the limp. This limp seems to depend, however, fully as much upon the relaxed, unsteady condition of the joint as upon the amount of shortening. Some of the patients limp badly who have but little shortening, and *vice versâ*. The lordosis seems to be a very distressing and conspicuous deformity in these cases, and in many of them there is considerable pain in the lumbar spine.

The treatment to be adopted will depend somewhat upon the age of the patient when presented. Hoffa says his operation should not be done on patients over ten years of age, and adds, " the younger the patient the easier it is." Lorenz has operated upon children up to fifteen years of age, but also advises earlier operation. Kirmisson considers the best age between four and six years. One of the great advantages of Paci's method is that it apparently gets good results in children too old for other methods of treatment, and in the very young as well. Therefore in children under ten years, or especially under seven years, we have a choice of several methods of treatment: the old treatment,—*i.e.*, support during painful periods, and a high shoe and pelvic girdle at other times; Hoffa's operation or Lorenz's modification of this operation; Lannelongue's injections of chloride of zinc; the method of continuous extension, pelvic girdle, and, finally, walking-brace; or Paci's manipulations.

From ten to sixteen years Hoffa's operation is not recommended. In still older cases with severe and disabling deformities Kirmisson's method of subtrochanteric osteotomy seems to benefit the patients considerably and without risk. Of these 113 cases, 74 were less than seven years of age when first seen, and 88 were under ten years. Judging from my own experience, in all these cases the shortening, which is due to the dislocation, can be overcome by continuous extension. It does not by any means follow that after this the head of the femur may be replaced in the acetabulum, nor that it will retain its position when traction is omitted. On the contrary, from an examination of the pathology it is very improbable that a true reposition can be made without an open operation, since the acetabulum, originally shallow, is generally still further filled up, and the hour-glass form of the capsule, usually present, would itself prevent a replacement. The relatively large size of the head would also prevent this. Then, again, even if replacement were possible, there is no sufficient bony barrier to prevent the head from slipping upward again when walking is attempted. As far as I know, every case treated by continuous extension and afterwards walking-apparatus has relapsed sooner or later after the apparatus was removed. The celebrated case of Buckminster Brown[1] has relapsed, and from a personal communication from Lovett I hear that Dr. Post's case[2] "has suffered a slight relapse." I have just received a letter from Dr. Max Schede, however, in which he says he has completely cured four cases without operation by means of extension and the use of his splint, which holds the affected limb abducted always, even while walking. These four cases were from six months to eighteen months old when first seen, and treatment was continued for from one to four years.

I am convinced that by conservative treatment a great deal can be accomplished for these cases in some instances. The method necessitates two or three years or more of the most exacting care from surgeon and attendant, and is evidently impracticable for dispensary cases. This method has been very generally used, however, and I find that many of the surgeons to whom I sent a circular asking for information as to the results they had obtained recommended it highly, and claimed that the results were very good indeed: that the limbs were made strong and useful and the deformity insignificant. The general tone of the replies was that, considering this to be so, an operation involving risk of life was not justifiable. A large number of prominent surgeons had never had any experience with these cases.

In one case I have had under treatment I pulled the head down to its normal position by a long traction hip-splint. I also applied a pelvic girdle with a crescentic pad over the trochanter to make pressure and prevent slipping upward. Nine months later I began to move the hip in its new position carefully in order to create a new joint. The head of the femur seems under treatment to have changed its position considerably, as it is now almost over the acetabulum instead of on the dorsum. A much firmer support is afforded here by the anterior superior spine and its muscles, and less lordosis is caused. This position is, I think, the best one to be gained, if the head is not actually replaced in the acetabulum. In this case the shortening has increased very little, if at all, in the five years she has been under treatment. This change from a dorsal to an upward dislocation as a result of mechanical treatment I have not seen reported, but it has occurred after operations where the capsule was not opened,—the head slipping upward after the operation into this position. In the case I have described, however, there is still so much abnormal mobility that I doubt whether the improvement will be permanent after the brace is removed.

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[1] Boston Medical and Surgical Journal, 1885, No. 23.

[2] Bradford and Lovett, Orthopædic Surgery, page 519.

Injections of a 10-per-cent. solution of chloride of zinc are recommended by Lannelongue[1] for the purpose of exciting a bony growth at the site of the injection.

Lannelongue[2] says his proceeding may produce a certain amount of arthritis and thickening of the soft parts, but that this is advantageous. The long hollow needle of a Pravaz syringe is carried down to the bone and the injections made as much as possible subperiosteally. The injections may be repeated after three weeks to insure success.

In a child three years of age he made eight punctures, and in each deposited about two drops of the 10-per-cent. solution. In a second operation on the same child, three weeks later, he injected twenty drops, making two semicircular rows of punctures, one centimetre apart, for the purpose of increasing the bony deposit. The only bad symptom was a little fever after the second operation. Two weeks after the second operation a bony projection was apparent below the crest. It was deep-seated and attached to the ilium, hard and very prominent, and surrounded the great trochanter above and behind. Lannelongue also immobilized the hip, and used continuous extension to keep the head in good position during this treatment. The result seemed good in this case, and he reported it to the Congress of Surgeons, in 1891, as a cure.

Coudray[3] reports a cure by this method obtained in a girl three years of age. After reduction of the shortening of three centimetres by Paci's method, two injections, at two months' interval, were made. Continuous extension in bed was maintained for five months. A month later the great trochanter was only one centimetre above Nélaton's line. The child was not allowed to walk, however, before the end of the year. This case remained cured, and was reported to the Congress of Surgeons again in 1893.[1]

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[1] Semaine Médicale, 1891, 510.

[2] Bulletin et Mémoires de la Société Chirurgie, Paris, 1891, XVII, 770.

[3] Congrès Français de Chirurgie, 1892, p. 714.

Jeuvell[2] reported three cases treated by these injections, repeated from two to five times. Two were cured, one of them a bilateral dislocation.

These are the only cases which I have been able to find reported as yet. The method is so simple that if it is as free from pain and danger as its author claims, it would seem a valuable addition to our treatment, especially after reduction has been attempted without opening the joint.

Gussenbauer[3] attempted to excite this new bone-growth by opening the joint by Langenbeck's incision and inserting two or three steel nails in the posterior rim of the acetabulum. They were left *in situ* six weeks, but the results were not good. In one case the bone was so thin that the nails would not hold at all.

Resection of the hip-joint has been done a number of times for this deformity, but the results have been, as far as I know, always bad where both joints were affected, and generally bad also in unilateral cases, so that this operation is not to be recommended.[4] In some very old and extreme cases, however, the head of the bone is so misshapen that it must be removed. Lorenz[5] has occasionally found these extreme changes even in young subjects,—once in a child two and a half years old.

König's[6] method of deepening the acetabulum by raising a periosteal flap from the ilium, inverting it, and sewing it to the capsule has been practically abandoned.

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[1] Annales d'Orthopédie, December, 1893.

[2] Annales d'Orthopédie, August, 1893.

[3] Annales d'Orthopédie, May, 1893.

[4] For reports on twenty-seven of these cases, see Lovett's "Diseases of the Hip," p. 207.

[5] Wiener klinische Wochenschrift, 1894, Nos. 11, 12, 13.

[6] Verhandlung der deutsche Gesellschaft für Chirurgie, Berlin, 1891, XX, pp. 1-75.

Karewski,[1] in February, 1889, opened the joint by an anterior incision and replaced the deformed head of the femur. It was a case of paralytic subluxation, and is the first, he claims, in which "bloody replacement" of a dislocated hip has been successfully done. By January, 1890, he had operated four times, and found that after the dislocation had existed for some time the acetabulum had to be enlarged to receive the head of the femur.

Hoffa published his operation in April, 1890,[2] for the first time. To his energy and scientific work, however, is due the greatest part of the popularity the operation known by his name enjoys.

He has very kindly sent me the advance sheets of the new edition of his work on orthopædic surgery, and I will briefly outline his operation as there described,—

Opening the joint by Langenbeck's incision; division of the capsule at its insertion in the neck of the femur; subperiosteal freeing of the great trochanter from all the muscles attached to it. In patients under five years old it is then almost always possible by flexion of the thigh and direct pressure upon the head to bring the head into the old acetabulum. The hip and knee now are often seen to be flexed. Hoffa overcomes this in young children by holding the head firmly in the acetabulum while an assistant gradually extends the leg on the thigh, so stretching the biceps, semi-membranosus, and semi-tendinosus. This is accomplished in three to five minutes.

In older children, six years and upward, it is generally better to divide these muscles, and this is done before opening the joint. Hoffa has adopted Lorenz's recommendation of dividing them at the tuber ischii. The limb is now abducted, and the adductors subcutaneously divided. The limb is now hyperextended and the soft parts attached to the anterior superior spine of the ilium, and the fascia lata are divided, by the open method so as to control better the hæmorrhage. These wounds are now dressed and then the joint is opened as described above. The head must be freed so completely that it can readily be brought out of the wound. Hoffa has never seen any necrosis of the head follow this free division. The ligamentum teres, if present, must be extirpated, and the insertion of the capsule into the neck freely divided. A sharp Volkmann spoon, bayonet-shaped, is now guided by the index finger to the acetabulum, and the fatty tissue and cartilage and a good deal of spongy tissue are scraped out, taking care to preserve the edges of the acetabulum. The cavity must be made not only deep but broad. This is best accomplished by cutting away posteriorly.

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[1] Centralblatt für Chirurgie, No. 36, 1892.

[2] Verhandlung der deutsche Gesellschaft für Chirurgie, XIX Kongress, p. 944.

The head is now reduced, and goes into place with a snap. If there is a rotation forward of neck and head, the limb must be put up in moderate inversion, otherwise the head will slip out of the new acetabulum. After a few weeks it may be brought to the normal position. Lorenz in such a case also advises putting the limb up in inversion, and a subsequent subtrochanteric osteotomy to correct this. The superfluous part of the capsule is extirpated, and the wound packed with iodoform gauze.

Small children are put in a fixation bed, with the limb abducted; older children in an extension dressing. In bilateral cases both sides may be operated upon at once.

Hoffa has operated seventy-five times now. All but the fatal cases were greatly improved by the operation. He wishes it understood that these children cannot be completely cured, since there is always more or less impairment of the nutrition of the limb independent of the shortening due to the displacement.

In bilateral cases he can reduce the waddling gait to a minimum, and can almost completely overcome the lordosis.

In unilateral cases he corrects the scoliosis and the shortening of the limb which is due to the dislocation. The limp which remains is not the characteristic disfiguring one of congenital dislocation, but that of a short leg. The new joint is firm, the motion is good, and is better the younger the patient is when operated upon. Ankylosis only occurs where there is suppuration, or where the acetabulum is not made broad and deep.

The first fixation dressing is kept on three to four weeks. Then massage and careful passive motion are used. After five weeks the child can stand and walk in apparatus which allows motion at the hip, but does not allow the head to escape from the acetabulum. This apparatus is worn until the joint is fully consolidated,—that is, for several weeks or months, according to the age of the patients. Bilateral cases wear only a supporting corset, At first the movements are not very easy on account of the imperfect adaptation of the head to its socket, but after walking, a return to the natural shape follows the restoration of the normal relationship between the articular surfaces.

Lorenz's modification of Hoffa's operation consists in opening the joint by a vertical incision, directly below the anterior superior iliac spine. The capsule is very easily reached in this way; is laid freely open by a crucial incision and the acetabulum gouged out with less danger of injuring its posterior rim. Lorenz first laid especial stress upon the fact that the main resistance to reduction was offered by the muscles whose fibres took the direction of the shaft of the femur rather than those inserted in the great trochanter. Hoffa had spoken of the resistance offered by the muscles inserted into the tuber ischii and the anterior iliac spines, but had not realized apparently that this was the main resistance. Lorenz,[1] on the other hand, now finds that the gluteal muscles have fibres running parallel with the shaft, and therefore these fibres may offer resistance to reduction. These fibres are only in those parts where these muscles overlap each other.

Lorenz has also, I understand, modified his operation by making a transverse incision directly outward from his vertical incision in order to afford still easier access to the acetabulum. In his latest report, however, he says he has devised a new method which will require the division of only one muscle, the tensor vaginæ femoris. The details he has not as yet published. By his old method he often does not divide at all the muscles inserted into the great trochanter.

He treats his cases after the operation just as Hoffa recommends. In some cases where there was great deformity of the femoral head and a short neck, he found it necessary to put the limb up in considerable abduction in order to prevent it slipping up, and while this was not objectionable in unilateral cases, it would be so in bilateral cases if this position needed to be permanently maintained.

Both Hoffa and Lorenz advise now against any attempt to reduce the dislocation without opening the capsule and deepening the acetabulum. Such cases were found to relapse.

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[1] Wiener klinische Wochenschrift, 1894, Nos. 11, 12, 13.

Broca uses a Langenbeck incision, but places it farther forward, so as to reach the muscles attached to the anterior iliac spines more easily.

Kirmisson[1] makes an incision from the anterior superior spine to the great trochanter, then down the shaft of the femur. In this way the insertions of the trochanteric muscles are easily detached, and the most direct access to the capsule is gained. He does not think the acetabulum can be enlarged as Hoffa says unless the excavation is made upward, which would necessarily cause shortening. He now voluntarily perforates completely the acetabulum, believing that the thick fibrous and muscular planes behind the acetabulum will protect the peritoneum from injury.

Kirmisson[2] has also lately reported some very good results obtained in old neglected cases with flexion and adduction by means of subtrochanteric osteotomy.

Ogston[3] and others have reported good results in this class of cases by resection of the head of the bone and the formation of a new acetabulum on the dorsum of the ilium.

Paci's method of treatment consists in forcibly manipulating the limb as if to reduce a traumatic dislocation,—that is, the limb is first forcibly flexed as far as possible, then abducted, then rotated outward, then extended. Afterwards the thigh is held completely extended and immobilized, and traction is applied. If the shortening is not completely overcome at the first operation, a subsequent one will probably accomplish the reduction.

In about two months the plaster-of-Paris splint is removed and an extension apparatus applied. About four months after the operation the patient is allowed to get up and walk with crutches. At night the extension is reapplied. The limb is massaged twice daily, and once a day receives electrical treatment.

Danger of the Different Methods.—There is no danger in the mechanical methods, of course, and none whatever in Paci's. Lannelongue's injections of chloride of zinc have thus far been harmless, but cause more or less pain, and in one case considerable fever for a few days.

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[1] Revue d'Orthopédie, 1894, No. 3, p. 219.

[2] Revue d'Orthopédie, No. 2, 1894.

[3] ANNALS OF SURGERY, 1888, VIII, p. 161.

I have notes on 177 cases of Hoffa's operation or some of its modifications, and among these are six deaths which may have been due directly to the operation. The mortality is therefore about 3.3 per cent.

Hoffa had two patients die a few hours after the operation, which in both cases was long and difficult. He ascribes these deaths to the narcosis, but he thought the hæmorrhage and shock also contributed.

His third death occurred twenty-four hours after the operation, and was probably due to iodoform intoxication, together with the shock and loss of blood. The girl was fourteen years old.

Kirmisson[1] had one case die from hæmorrhage and peritonitis eight days after the operation following perforation of the acetabulum. He used a gouge and mallet, which would appear to be more dangerous than curetting. His second death[2] also followed perforation of the acetabulum. The boy was seven years old, the operation long and difficult. He died of septicæmia, but the condition of the joint showed nothing.

Broca is reported to have had one death, but I cannot find the reference.

It would thus appear that Kirmisson's modification of Hoffa's method is a dangerous one, or his technique is defective.

Under strictly aseptic conditions it seems to me the operation should not be dangerous. On account of the irregular shape of the wounds, however, and the fact that the replaced head will act like a cork and retain any germs present, infection must be most carefully avoided. The position of the wounds also, especially in young children, will require great care to prevent the dressings becoming soiled and the occurrence of secondary infection.

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[1] Revue d'Orthopédie, January, 1893.

[2] Revue d'Orthopédie, January, 1894.

Hoffa[1] showed a case of bilateral dislocation operated upon over three years before. There had been no relapse. There was no lordosis, no waddling gait; the joints were sound, and showed very good motion. The child ran about all day without pain or fatigue.

He presented two other unilateral cases, which showed firm joints and good motion. One, a girl of eight years, operated upon three years ago, the other, two and a quarter years old, operated upon one year ago.

He said, " In all my other cases equally favorable results were obtained, after operations made in the manner recommended." Dr. Hoffa is an enthusiast, and states his case strongly, so I feel a little hesitancy in accepting such a broad statement without more details being given. The saving clause " after operations made in the manner recommended" *may* exclude some cases.

Lorenz, however, is also very enthusiastic in regard to his operation. He considers three to four years the most favorable age for operating, and does not like to operate after seven years. He thinks the distortions of the head and neck sometimes counterindicate the operation. These distortions can often be made out before operation.

He has now operated on sixty-three cases, and has recorded no death, and but three relapses, which were due to an anteverted neck. He often completes his operation in twenty minutes.

He reports[2] a very bad result from his first operation, in which he followed Hoffa's method, and which made him devise his own. Suppuration ensued, the knee also was affected, and finally there was a relapse of the deformity.

He reports this case among others: Girl eight years old. Operation, December 29, 1892. Fourteen months later absolute anatomical and functional cure. Not the slightest limp; runs, jumps, etc. Flexion from 180 degrees to 90 degrees. Abduction, adduction, and rotation free; muscular power as good as that of the other side.

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[1] Verhandlung der deutsche Gesellschaft für Chirurgie, Berlin, 1893, XXII, 12.

[2] Centralblatt für Chirurgie, 1892, No. 31.

In Karewski's five cases[1] the femurs remained in place at first with free motion. In two of them the orthopædic apparatus was removed too soon, and they are beginning to relapse. One did well until he died of scarlatina. Two walk almost naturally now, eighteen and twenty-four months after the operation.

Karewski thinks cases of paralytic dislocation should give better results than the congenital dislocations, because the acetabulum is probably better formed in the former.

Schede[2] reports the results he has obtained in seven cases treated by Hoffa's operation. The patients were from four to twenty years of age. The shortening was greatly reduced in each case, and after the operation in no case exceeded two centimetres. The limp was in each case much improved, as was also the ability to walk about. One case suppurated, and in two a tendency to a recurrence of adduction and flexion had to be corrected by brisement.

Paci[3] reports on fifteen cases, and they are almost perfect a year and more after operation. He says Redard, Nota, Regnoli, Motti, Rota, Ceci, Oliva, and Galbozzi have examined some of his cases, and were greatly pleased with the results he had obtained. On the other hand, Kirmisson reports seeing[4] a case said to have been reduced in this way, but which was not. The head of the femur lying directly above, not in the acetabulum. The functional result, however, was very good.

I cannot myself understand how it is possible to *get* and *maintain* such good results as Paci reports, when we consider the pathological conditions present. And, theoretically, I cannot see how he can expect to get any better results than have been obtained by the method of gradual extension, immobilization, and protection, which has been so long and widely practised. He obtains his reduction at once, however, and this is a very great advantage, hardly to be over-estimated, and the traumatism inflicted may also help to secure the head of the bone in its new position by exciting an inflammatory exudate. The children he reports are from eight to sixteen years of age, and the results are most excellent a year and more after the operation.

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[1] Centralblatt für Chirurgie, Leipzig, September 10, 1893.

[2] Personal communication, May, 1894.

[3] Archivio di Ortopedia, Anno IX, No. 6, and *idem*, Anno X, No. 1.

[4] Revue d'Orthopédie, May, 1894.

It would thus seem that this is the method to be first tried at any age. If this does not succeed, we may try in addition injections of chloride of zinc, and later still, if the child is not over ten years old, Hoffa's operation, or Lorenz's modification of it, which seems to me preferable. If we have to do with an old, deformed, or painful case, Kirmisson's subtrochanteric osteotomy may be done, or Hoffa's new operation, in which the head of the bone is sawed off at the intertrochanteric line, the posterior part of the capsule cut away to allow good apposition with the ilium, and the limb put up in abduction. Walking with a supporting apparatus can be begun then after about three months.

Redard's observations[1] agree with my own that after the bloody reposition—

The number of perfect cures is very small.

The number of cases improved is large.

The results in double dislocations are not so favorable as in single.

The lordosis is generally corrected.

A slight spinal curvature generally persists, owing to the atrophy of limb and pelvis.

The limp persists to some degree almost always, though, if the posterior dislocation is relieved, a high shoe will correct this limp almost if not quite perfectly.

When we consider that these cases will certainly become more and more deformed as they grow older, that about one-third of them will have repeated attacks of pain and disability, and that many cases are reported where the patients are rendered helpless by the flexion and adduction of their limbs, it seems to me we ought no longer to send them away without treatment. The mortality of Hoffa's operation is less than it is generally believed to be. The improvement in technique has made it much easier and more rapid, and the results are improving. And better still, Paci has made it possible by his rapid method to treat many cases who could not afford the time and attention demanded by the older methods.

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[1] Traité de Chirurgie orthopédique, Paris, 1892, p. 534.

In view, then, of these good results, and the even more promising character of the latest reports, we may undertake the treatment of these cases with the assurance that we can benefit them very materially in a comparatively short time.